No. 808,947. PATENTED JAN. 2, 1906.

F. L. RICE.

COMBINED WATER HEATER AND PRESSURE RESERVOIR.

APPLICATION FILED OCT. 26, 1903.

Fig. 1.

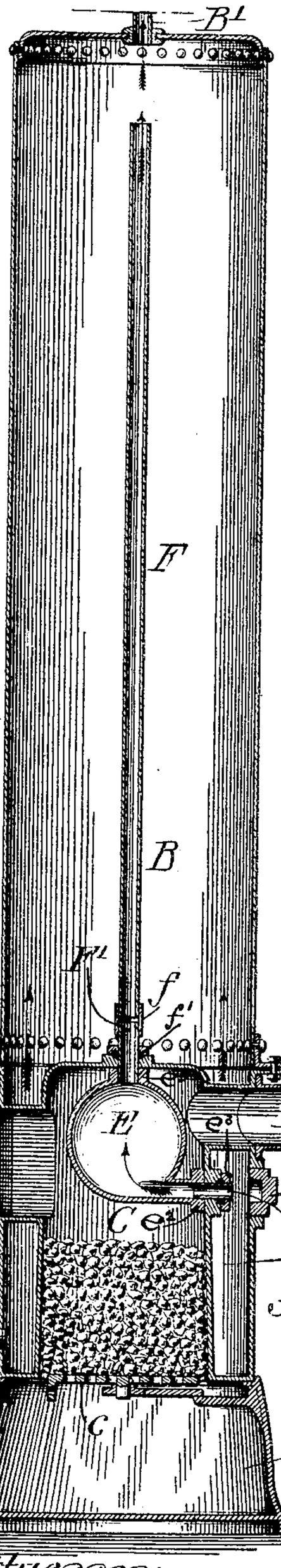


Fig. 2.

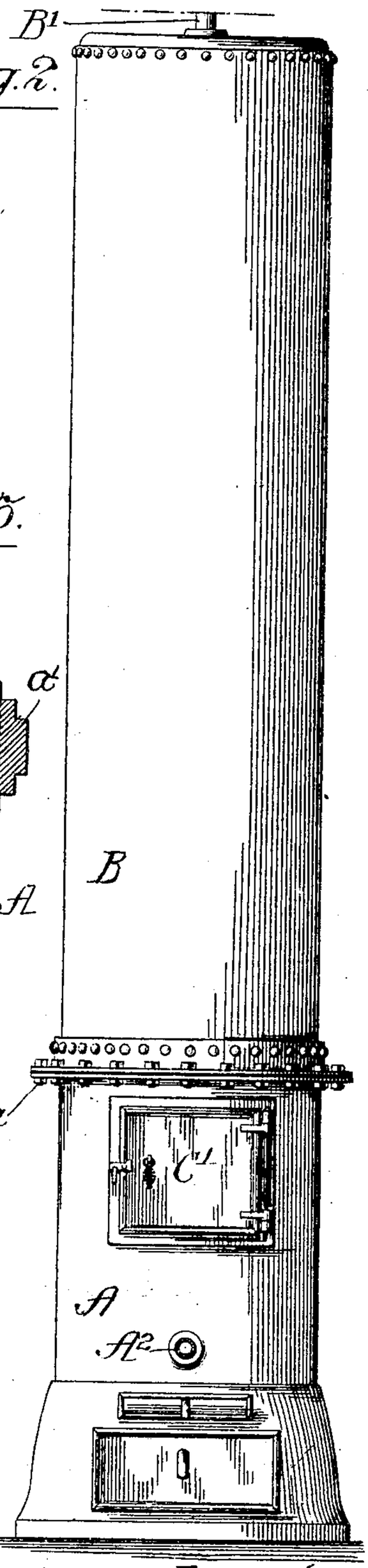
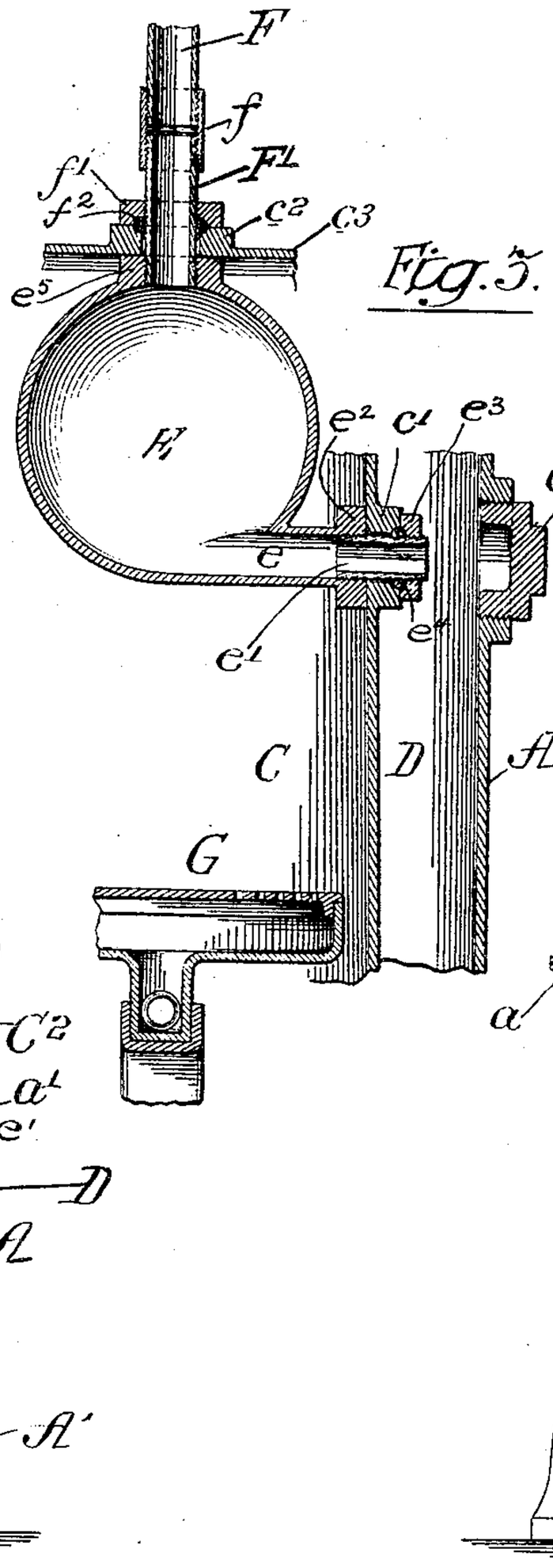


Fig. 3.



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UNITED STATES PATENT OFFICE.

FRANK L. RICE, OF CHICAGO, ILLINOIS, ASSIGNOR TO JAMES B. CLOW & SON'S, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

COMBINED WATER-HEATER AND PRESSURE-RESERVOIR.

No. 808,947. Specification of Letters Patent. Patented Jan. 2, 1906.

Application filed October 26, 1903. Serial No. 178,538.

To all whom it may concern:

Be it known that I, FRANK L. RICE, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in a Combined Water-Heater and Pressure-Reservoir; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in combined pressure water reservoirs and heaters of the general type shown in the prior United States Letters Patent, No. 577,390, granted on the 16th day of February, 1897, to myself and Adelbert D. Langworthy.

Among the objects of my invention is to simplify the construction and improve the operation of such apparatus.

In the drawings, Figure 1 is a central vertical sectional view of a combined pressure reservoir and heater constructed in accordance with my invention. Fig. 2 is a side elevation thereof. Fig. 3 is an enlarged fragmentary sectional view showing the combustion-chamber and adjacent parts.

As shown in the drawings, the device is divided into two main parts or sections A and B, the former containing the combustion-chamber and supported on a base A′ and the latter constituting the tank or reservoir and made, preferably, of sheet metal. The two parts A and B are secured together at their meeting ends by bolts *a*, extending through radial horizontal end flanges of said parts and a gasket between said flanges.

C is the combustion-chamber within the lower section A, which is made of less diameter than said lower section, thereby providing around the combustion-chamber an annular water-space or water-leg D, which communicates with the interior of the reservoir B. The combustion-chamber C is herein shown as provided with a grate *c* and arranged for burning coal, though arrangements may be made for heating the device through the medium of a gas-burner G, as indicated in Fig. 3. The combustion-chamber is charged with fuel through an opening at one side thereof, closed by a door C′, and is provided at its other side, near the top, with an exit-passage C^2 for the products of combustion, to which passage is adapted to be attached a smoke-pipe for leading the products of combustion away from the device. The opening through which the combustion-chamber is charged and the outlet-passages C^2 are formed in box-like casings or passages which extend across the water-leg D, as clearly shown in Fig. 1. Cold water is delivered to the reservoir through a pipe A^2, leading into the lower end of the water-leg D, and warm water is withdrawn from the reservoir through a pipe B′, located at the top thereof.

Within the combustion-chamber, at the top thereof, is located a central water-chamber E of relatively small capacity and herein shown as having the general form of a sphere or globe. This form of the chamber facilitates the passage of hot gases around the chamber and avoids the formation of pockets at the lower side thereof, such as, if present, would impede the circulation of the hot gases uniformly over the lower surface of the chamber, with a result of imperfect heating. Said water-chamber E is provided at its lower side with a tangentially-disposed branch or passage *e*, which communicates with the water-leg D, and at its upper side said chamber E communicates with a pipe F, which rises centrally upwardly through the reservoir B and is located with its upper open end near the top of said reservoir. The passage *e* communicates with said water-leg D through the medium of a short tube *e′*, which has interior screw-threaded engagement with the branch *e* and extends freely through an apertured boss *c′* in the wall of the combustion-chamber. A stuffing-box is formed about the tube *e′*, which consists, as herein shown, of an outwardly-facing flange or shoulder e^2 on the branch *e*, which engages the inner face of the wall of the combustion-chamber, a nut e^3, which has screw-threaded engagement with the outer end of said tube *e′*, and a gasket e^4, which is interposed between opposing annular recesses formed in the adjacent faces of the nut and the boss or outer face of the combustion-wall. The opening at the upper side of said central water-chamber E communicates with the vertical pipe F through the medium of a short tube F′, which has screw-threaded engagement with the upper passage of said water-chamber and extends freely through an opening in the top wall c^3 of the

combustion-chamber and is connected at its upper end by a coupling f with the lower end of the pipe F. A stuffing-box surrounds the tube F′, which comprises, in combination with an upwardly-facing shoulder e^5 on the chamber E, which engages the bottom face of said top wall of the combustion-chamber, a nut f', having screw-threaded engagement with the tube F′, and a gasket f^2, interposed between said nut and a boss or thickened part c^2 of said upper wall of the combustion-chamber. By reason of the screw-threaded connection of the tubes e' F′ with the branches or passages of the water-chamber and of the fact that said tubes extend freely through the combustion-chamber walls said chamber is made readily removable, while the passage of water to the combustion-chamber through the openings through which the tubes extend is prevented.

In the operation of the device the cold water is introduced thereinto through the pipe A^2 and is first exposed to the heat of the combustion-chamber in a relatively thin sheet while passing through the water-leg D. A portion of the water passes into the chamber E, located in the top of the combustion-chamber, and while passing through the relatively narrow inlet-passage leading to said chamber and also while passing through said chamber it is exposed in a relatively small body to the direct heat of the combustion-chamber and such water as passes into and through said chamber E becomes quickly heated. The heated water rises through the pipe F and is discharged therefrom at or near the place from whence it is drawn from the reservoir—to wit, near the top of said reservoir. Such water as does not pass through the chamber E is heated by the heat of the combustion-chamber, and the water as it is heated rises upwardly by convection in the reservoir in a familiar manner. In this way the water is kept hot at the point of withdrawal from the reservoir. It will be also observed that the water at this point may be very quickly heated when required on short notice and, further, that the water may be maintained in a heated condition at its point of withdrawal from the device when the water is being continuously used within the available capacity of the heating device.

The wall of the water-leg opposite the inlet of the central water-chamber is provided with a removable plug a', the removal of which permits access to the inner chamber to clean the same and also access to this point to enable the tube e' and the stuffing-box to be detached and fitted in place. The stuffing-box ring f' at the upper side of the chamber E is set in position before the reservoir B is bolted to the lower section containing the water-leg and combustion-chamber. The arrangement of this joint at or near the top of the combustion-chamber is advantageous, for the reason that it renders the assemblage of the parts convenient and enables the device to be readily cleaned and repaired.

The pipe F passing upwardly through the reservoir and opening at the top thereof enables the water heated in the central chamber E to be rapidly delivered to the upper part of the reservoir or point at which the water is to be withdrawn from the reservoir. In some instances, however, the heated water from the central chamber may be discharged directly into the lower end of the reservoir.

The construction of the central chamber E as a separate part and removably joined at its induction and eduction sides to the water-leg and reservoir by the stuffing-box arrangement shown is of considerable importance, first, for the reason that it simplifies the casting of the parts, and, secondly, because it enables the chamber to be readily removed and repaired or replaced in the event of the central chamber becoming damaged for any reason. When the chamber E is to be removed, the reservoir is first removed, after which the pipe F is detached from the tube F′. Thereafter the stuffing-box nuts f' e^3 are removed and one of the tubes e' F′ is unscrewed from the chamber and drawn outwardly If the tube e' be thus removed, the chamber E is dropped sufficiently to allow the upper tube to pass out of the opening in the top wall of the combustion-chamber. On the other hand, the chamber may be removed by first unscrewing the upper tube F′ and thereafter shifting the chamber sidewise sufficiently to pass the side tube e' out of its opening in the combustion-chamber wall.

It will be observed that the lateral opening is located at the bottom of the water-chamber, so that when the device is out of use water may be entirely drained from said chamber. Moreover, the arrangement permits the water-chamber to be readily cleaned of incrustation or deposits on the lower part of the wall thereof, this being made possible by the location of the branch e at the bottom of the water-chamber and the location of the removable plug a' in the water-leg wall in alinement with said branch or passage.

I claim as my invention—

1. A combined reservoir and heater comprising a casing, a reservoir which rises from and is supported on the casing, a combustion-chamber within the casing, which forms with the latter a water-leg, communicating at its top with the reservoir, a water-chamber within the combustion-chamber, a delivery-pipe which rises from the water-chamber through the reservoir and discharges into the top of the latter, said delivery-pipe communicating at its lower end with said water-chamber through an opening in the top wall of the combustion-chamber, and an inlet-pipe which passes through a smooth hole in the side

wall of the combustion-chamber, enters an aperture in the side wall of the water-chamber, and communicates at its outer end with the water-leg, said delivery and inlet pipes being provided with removable packing means for making tight joints between the same and the top and side walls of the combustion-chamber.

2. A combined reservoir and heater comprising a casing, a reservoir which rises from and is supported on the casing, a combustion-chamber within the casing which forms with the latter a water-leg communicating at its top with the reservoir, a water-chamber located within the combustion-chamber, a delivery-pipe which leads from the water-chamber upwardly through the reservoir and discharges at its upper end into the latter, said delivery-pipe extending at its lower end downwardly through the top wall of the combustion-chamber and having screw-threaded connection with the top of the water-chamber, and an inlet-pipe which extends horizontally through the side wall of the combustion-chamber, communicates at its outer end with the water-leg, and has screw-threaded connection with the water-chamber; said water-chamber being provided at its top and side walls with annular, outwardly-facing shoulders which surround the delivery and inlet pipes and are adapted to bear against the inner faces of the top and side walls of the combustion-chamber, and the said delivery and inlet pipes being provided outside of said top and side walls with nuts and with gaskets interposed between the said nuts and the outer faces of said top and side walls.

3. A combined reservoir and heater comprising a casing, a reservoir which rises from and is supported on the casing, a combustion-chamber within the casing which forms with the latter a water-leg communicating at its top with the reservoir, a water-chamber located in the combustion-chamber, said water-chamber having a downwardly-convexed bottom and an integral, outwardly-directed branch forming an inlet-passage at the level of the lowermost part of the said chamber, an inlet-pipe which extends horizontally through the side wall of the combustion-chamber, is in communication at its outer end with the water-leg and is connected with said outwardly-directed branch inside of the combustion-chamber, the casing-wall being provided in line with the said inlet-pipe with an opening provided with a removable closure, and a discharge-pipe which communicates at its lower end with the top of the water-chamber, extends through the upper wall of the combustion-chamber, and discharges at its upper end at the top of the reservoir.

In testimony that I claim the foregoing as my invention I affix my signature, in presence of two witnesses, this 22d day of October, A. D. 1903.

FRANK L. RICE.

Witnesses:
WILLIAM L. HALL,
GERTRUDE BRYCE.